GARDEN AND FOREST.

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Public Reservations in the State of New York.

FOUR years ago a body known as the Trustees of Public Reservations organized under an act of the Massachusetts Legislature, for the purpose of acquiring and opening to the public, under suitable regulations, beautiful and historical places and tracts of land within that commonwealth. The establishment of this commission was the act of an enlightened community. It was a step forward, and offered an example and a challenge to the public-spirited people of other states to adopt similar measures, until it shall become a recognized policy throughout the country to preserve for posterity the natural beauty we have inherited, and to protect for the inspiration of future generations all those places which are rendered sacred by patriotic memories. Of course, there have been sporadic efforts in this direction all over the country. Pennsylvania has the camp-ground at Valley Forge; New Jersey has acquired the fine old colonial mansion and grounds at Morristown, where Washington held his headquarters, and this state has taken possession of Niagara and has made some effort to save the Adirondacks. But the Massachusetts plan has the advantage of being comprehensive and complete. No special legislation is demanded. The trustees can accept donations, purchase property, make necessary regulations for the maintenance of these reservations, and have all power necessary to acquire and preserve for public use forever any places which it may be desirable to secure.

It is an encouraging fact that the Legislature of New York has also taken action in this matter, and that Trustees of Scenic and Historic Places and Objects have been organized under law in this state. This result is largely due to the labors of Andrew H. Green, Esq., of this city, who is especially desirous to keep from defacement and ruin certain localities of historic interest in the upper part of this city and elsewhere in the state. In his original memorial Mr. Green called attention to the fact that there were many places in this state made memorable by conflicts during the half century of the French and Indian wars of the colonial era and by the stern conflicts of the Revolution, and, besides these places which are hallowed by their connection with the past, the varied topography of the state includes landscapes of world-wide celebrity, water spectacles and picturesque islands, incomparable lake areas, wooded mountain ranges and scores of picturesque valleys, which ought to be preserved in their primitive beauty. This Board of Trustees has organized in a practical and business-like way, with Mr. Green for President; John N. Francis, of Troy, for Vice-President; Edward P. Hatch as Treasurer, and John Winfield Scott as Secretary. The incorporators are all men well known for their public spirit, and as they come from all parts of the state it is expected that through their influence local historical societies, town boards and private individuals will be stimulated to coöperate with the trustees.

We need not add that in our view of the case this action of the state of New York is far removed from anything trivial or merely sentimental. We believe that the opportunity to drink in the quiet delights of natural scenery is more and more a necessity, especially to the thronging laborers in our busy towns, and that the contact with natural beauty is distinctly refreshing and uplifting. We also believe that places hallowed by patriotic action and suffering, minister directly to the mental and moral health of the people by the appeal they make to our generous passions. Americans are sometimes inclined to reproach themselves for possessing less interest in the past than that which prevails in the older civilizations of Europe, but it is little more than a year ago that a society precisely like those we are discussing was formed in England for the purpose of protecting scenes of natural beauty and historical renown from being vulgarized and ruined. Quarrymen are defacing the Palisades in our own country, but Chedder Cliffs are suffering in the same way in England, and the necessity of coöperating to protect such places has been felt in England just as it has been in Massachusetts and New York.

Every public-spirited citizen of the Union ought to realize the fact that many places in the country around which interesting memories cluster are in danger simply because there is no custodian to whom they can be legally transferred, and by whom they may be guarded. The disfigurement of natural beauty will go on, old landmarks will be destroyed and old earthworks leveled under the plow whenever they come under the ownership of men who have no feeling for their beauty or interest. Every state ought to make haste to pass a law incorporating a body like these trustees. The good work accomplished by such a body will not cease with the simple protection of a spot here and there. It will invite the attention of all who visit and enjoy these places to their value, and it will develop a sentiment which will grow by exercise, and will assist to a certain extent in inspiring the people with something like a reverent regard for natural beauty wherever it is found. If this sentiment ever becomes as pervasive and vigorous as it should be, there will be less need to set apart special reservations, for all the people will be prepared to rise against the obliteration and defacement of natural beauty. The vandalism of the advertiser will cease, the great corporations will no longer needlessly mar the most pleasant prospects in operating their mines and quarries and railroads and factories, and each generation will feel it a sacred duty to leave the world to their successors as fair a dwelling-place at least as they found it.

A movement is on foot to commemorate in some appropriate way the genius of Francis Parkman. As a historian, as a man of letters, as a true hero who added dignity to American scholarship in spite of life-long physical limitations, Francis Parkman deserves a grateful recognition by his countrymen. It would hardly come within the field of this journal, however, to invite attention to this movement if Francis Parkman, in addition to his other claims to

distinction, had not been eminent as a horticulturist and untiring in his efforts to preserve our rich inheritance of natural scenery. No pen has described the grandeur of our primeval forests with such poetic truth as his; no man ever loved nature more sincerely. In the very first number of this journal he made an eloquent plea for the protection of the forests of the White Mountains, and till the day of his death this subject was one in which he took a vital interest. This movement, however, makes appeal in a still more direct way to every one interested in horticulture as a fine art. It is not decided what form this memorial shall take, but it is proposed to erect it in the garden that Parkman loved, on the banks of Jamaica Pond, which has now been taken as a part of the Park system of Boston. Here, thirty years ago, he wrote the *Book of Roses*, which remains a standard authority in many branches of this subject to this day. Even before this the first collection of plants sent to America from Japan was planted in this garden, including the beautiful double-flowered Apple which bears his name, and many other plants now well known to our gardens. Here was established one of the very earliest good collections of hardy herbaceous plants in the country; here he made those experiments in hybridizing and cross-breeding which were described in one of the most interesting horticultural papers of its time. It is altogether fitting that every American who loves garden-art should have the privilege of contributing to this memorial of one who holds such a distinguished place in the development of horticulture in America. Contributions can be sent to Mr. Henry L. Higginson, 44 State Street, Boston. The committee in charge are men of cultivated taste, and there is every assurance that this memorial, whatever it may be, will not lack adequate dignity and refinement.

Park vs. Grove.

A FASHION is prevalent in some western states which is of enough importance to warrant some comment, and if the mental derangement which it seems to indicate can be properly diagnosed and treated, the undertaking will be worth a great deal to many communities. Now, there are very few real parks in western towns, unless delightful bits of virgin scenery are to be accepted under that head. The pleasure-grounds where, with natural conditions more or less propitious, an intelligent art has wrought any satisfying or pleasing effect, are exceedingly rare. At the same time there are not wanting hundreds of attempts in this direction. Almost every prairie town of any consequence at all has its so-called park. Sometimes this park and the fair-grounds are combined. Whether the park be fair-grounds, race-track or plain park, however, the location is usually upon some thoroughly flat, featureless and treeless plat, where the City Council and the Street Commissioner can give their creative instincts full swing. This park is laid out in intricate and wonderful patterns. It contains race-tracks, baseball grounds, camp-meeting stands, carp ponds, fountains or fences, according to the whims of the Street Commissioner and the demands of the populace. It is profusely set with trees, Cottonwoods having a large majority, and these are then left to struggle with a magnificent annual crop of Sunflowers. This picture is not in the least overdrawn. Any one who has ever lived in the west knows it to be the sober truth. As a consequence of the construction and maintenance of this park it is unfrequented and neglected. If the county fair is held on the grounds in the fall the Sunflowers are mowed, and for three days the park is crowded and useful.

Now, it is a strange companion picture to this which one sees if he visits "The Grove." Near most towns will be found pieces of natural woodland, usually along some stream, to which the picnic parties always turn with a natural impulse, which largely discredits their ill-conceived ideas of a park. Every town has its "Wilson's Grove" or "Johnson's Grove," which is a place of this sort—virgin woods and streams and rocks, unmarked by any attempt at art. This is the place to which the citizens all retreat when the appetite for fresh air and shade and outdoor rest is to be satisfied.

The name Grove, as applied to this picnicking rendezvous, in contradistinction to the Park, is of some interest. These terms are commonly accepted and used with the utmost clearness of distinction, showing that in the popular mind the two articles are in no way related. Nevertheless, it would appear at once to the artist in landscape that the grove is by far the more satisfactory park. And were the parks of western cities planned by landscape-artists there is no doubt but that they would usually be located where unperverted instinct has found a satisfying grove, and seldom or never where false instruction has led citizens to make their so-called parks.

I have in mind one particular western village of more than usual culture and enterprise, which may, however, be taken as an example. This town has expended many hundreds of dollars in making a park on forty acres of valuable land. One corner is kept mowed for a baseball field, and this is the extent of the use found for the park. Quite as near the town, on the opposite side, are uncommonly fine stretches of natural timber, a beautiful river, suitable for boating and bathing, some hills and ravines, which would make a delightful park. These woods, used otherwise only for pasture, constitute The Grove; and to them comes the crowd for the soldiers' reunion, the picnic, the circus, and so forth.

Many times delightful results might be obtained if the work which has been put on a city park could have been judiciously expended on The Grove. And this shows us the direction in which lies the remedy. The existence of the park shows the public spirit and liberality of the citizens. The general favor in which the grove is held demonstrates the unspoiled instinct for sylvan pleasures. The solution of the difficulty would be to unite the two, and here is a problem worth attacking.

Stillwater, Oklahoma. *F. A. Waugh.*

The Banksian Pine in the Nebraska Sand Hills.

SO far as I know there has been but one experiment made with Pinus Banksiana in the plain region. In 1891 the Chief of the Forestry Division furnished Mr. H. C. Brunner, of Holt County, Nebraska, enough trees to plant three experimental plats of one acre each on the crest and slopes of one of the highest sand hills in the entire Sand Hill region of Nebraska. One of these plats was planted principally to Banksian Pine, the remaining species being other conifers.

This Pine was chosen because it thrives on the sand dunes of Lake Michigan, and the soil conditions of the two localities are not dissimilar, consisting of an almost pure sand. In a visit to the Nebraska plantation last October I was surprised to find the sand quite moist only a few inches below the surface, on the crest of the ridge, in spite of an unbroken drought of months. The trees were four to six inches high when planted. Practically, all the other species failed, only a few Scotch and Bull Pines showing where hundreds had been set. But the Banksians had thrived. While yet three miles from the plantation they were easily discernible, a green patch on the very crest of the brown sand hill. Examination showed that over half of the trees, which had been planted two by four feet apart, were in thrifty condition, ranging from ten inches to almost four feet in height. The best growth of the year was eleven inches. The trees had been set in a furrow made in the unplowed sand, on which grew a scant herbage of grasses. Had the plat been plowed the sand would have blown away, as is proven by the many "blow-outs" seen while crossing the Sand Hills from Burwell to Ainsworth. The scant vegetation held the sand in place, and the Banksian Pine had become established. Barring unforeseen accidents, there is sure to be, in the course of twenty years, a tiny Pine grove in this vast desert region, devoid of trees and

only useful for the splendid growth of grasses in its valleys.

The Banksian Pine has a great northern range, being found from Michigan north-westward through Minnesota and into Manitoba, but it is not a native of the plains region. In standing where a great percentage of Bull Pine failed—the latter being native within sixty miles—it not only shows peculiar adaptability, but suggests its extensive use as a pioneer tree throughout the sand hills of Nebraska—a region from thirty to sixty miles wide and over two hundred miles long.

Washington, D. C. *Charles A. Keffer.*

Foreign Correspondence.

London Letter.

Bulbophyllum grandiflorum.—A plant of this was shown in flower last Tuesday by Sir Trevor Lawrence under the very inappropriate name of Bulbophyllum Burfordense. It was first figured and described by Blume in *Rumphia*, iv., page 42, where it is said to be "wild in woods on the coast of New Guinea. Flowers the largest of the genus, above eight inches in diameter; scape six inches high. The dorsal sepal brownish and netted with a paler color, the others not netted. Lip whitish, with red spots." The flower on the plant shown by Sir Trevor Lawrence had a concave sepal four and a half inches long and two inches broad, the two lateral sepals being narrower, but quite as long, the petals and lip being small and inconspicuous. The color of the dorsal sepal was yellowish green, with gray mottling and darker veins, the other two being dull pale brown, with a gray reticulation. Rhizome as thick as a goose-quill, the pseudo-bulbs an inch apart, narrow, ovate, an inch long, each bearing an oblanceolate leaf eight inches long by two in width. Although wanting in color, this is one of the most remarkable Orchids introduced in recent years. Sir Trevor obtained it from L'Horticulture Internationale a few years ago, this being the first time it has been seen in flower in Europe. There is, however, another Bulbophyllum of this name, a figure of which will be found in *Lindenia*, vol. iii., t. 108 (1887), and which had been introduced from New Guinea by Monsieur Linden, and flowered in his nursery. Reichenbach identified this with Blume's plant, an extraordinary blunder, the two being very widely distinct. For the latter plant Mr. Rolfe proposes the name of B. longisepalum, on account of its very narrow attenuated sepals. Both, however, belong to the same section, namely, Sarcopodium.

Bollea Schrœderiana.—This is a new species, according to Messrs. F. Sander & Co., who have lately introduced it, and who showed it in flower last Tuesday, when it was awarded a first-class certificate by the Royal Horticultural Society. It was a fine specimen, bearing eleven large fragrant flowers with white sepals and petals, flushed at the tips with rose, and a pink labellum, which had a short claw and a thick boss-like crest. Botanically it belongs to the Zygopetalums, but for garden purposes the sectional name, Bollea, is convenient.

Dendrobium Cordelia is a new Veitchian hybrid between D. aureum and D. euosmum leucopterum, the latter being the seed parent. It most resembles D. aureum, the sepals and petals being cream-white, with a tinge of rose on the margins, the lip being purplish, with yellow blotches and veins. It received an award of merit. The "pedigree" of this hybrid is as follows: D. Japonicum × D. aureum=D. Endocharis; D. nobile × D. Endocharis=D. euosmum; D. aureum × D. euosmum, var.=D. Cordelia.

Dendrobium Hildebrandii.—We are indebted to Mr. Hildebrand, of the Shan States, in Upper Burma, for the discovery of this Dendrobium, as well as for the introduction of various other good garden-plants—that is, Lonicera Hildebrandii, Æschynanthus Hildebrandii, etc. The Dendrobium was first introduced to England by Messrs. Low & Co. in 1893, when only a single plant, now in the collection of Baron Schrœder, was received. This week Messrs. Low & Co. sold a large importation of it by auction, and as the species is known to be a desirable one, and the plants were in good condition, they realized good prices. The species is closely allied to D. tortile, which, again, is, of course, not unlike D. nobile, but there is considerable variation in color in the new one, some of the flowers being yellowish, others rose-tinted, the lip being blotched with red in some cases, pure yellow in others. The flowers are about two and a half inches wide, and, as in D. tortile, the sepals and petals are more or less spirally twisted. It is likely to become a popular plant with Orchid-growers.

Dendrobium nobile nobilius.—A truly marvelous specimen of this beautiful Orchid was shown last Tuesday by Mr. E. Ashworth, Wilmslow, Cheshire. Some of the pseudo-bulbs, of which there was quite a sheaf, were nearly four feet long, and the number of expanded flowers upon them was three hundred and eighty-nine. Typical Dendrobium nobile, when well flowered, is one of the grandest of Orchids, and as the variety nobilius is probably the best of the many fine-named varieties of it now in cultivation, the magnificence of Mr. Ashworth's specimen can easily be imagined. The flowers are larger and darker in color than any, the sepals and petals being rich amethyst and the lip dark maroon, with a cream-white margin. There are not a few spurious plants of nobilius about, but all the genuine ones are from one plant, which was first shown in flower at Ghent in 1878 by Messrs. Rollison, of Tooting, when it nearly succumbed to exposure, but luckily it was saved by Mr. James, of Norwood, who succeeded in propagating six young plants from the old pseudo-bulbs.

Jasminum sp. aff. J. nudiflorum.—Dried specimens of a Jasmine collected in Yun-nan by Mr. W. Hancock, F.L.S., have recently reached Kew, where it has been determined to be a new species allied to Jasminum nudiflorum. The latter is one of the oldest and best of our hardy winter-flowering scandent shrubs, its yellow flowers, freely produced in fascicles all along the whip-like branches, being the delight of many an old garden-wall in the depth of winter, if only the sun shines now and then. The new one has flowers exactly like those of D. nudiflorum, but at least twice as large, the dried flowers of the former being nearly two inches in diameter. It is to be hoped that living plants of this most desirable plant will soon be forthcoming. Perhaps Dr. Henry, now in England, but who, I believe, intends shortly to return to Yun-nan, will add the introduction of this plant into English gardens to his many achievements in the interests of botany and horticulture. J. nudiflorum is a native of China; possibly this new one is a big variety of it. Let us hope it is.

Magnolia Campbelli.—I have already recommended this grand Himalayan Magnolia to readers of Garden and Forest. To-day, Mr. Osborne, the gardener to J. Smith-Barry, Esq., M.P., Fota, near Cork, has sent me two magnificent blooms of it, cut from a tree twenty-five feet high, growing in the open air. He says it is not very free-flowering in the moist, usually sunless climate of Fota, but I have heard of the large specimen in Mr. Crawford's garden, in the same neighborhood, flowering very freely. It is quite hardy at Kew, even the severe weather of the past winter having done it no harm. The flowers are as large as those of M. grandiflora, but colored a charming rosy or blush-red, reminding one in their elegance of form and richness of tint of a dark variety of Nelumbium speciosum. It is a native of the eastern Himalaya at an altitude of 8,000 to 10,000 feet, where it forms a lofty tree with "white or rose flowers six to ten inches in diameter." The leaves are ovate, glaucous green, about eight inches long and deciduous.

Cornus Mas.—The prettiest tree in the arboretum at Kew this month is the Cornelian Cherry, a well-known garden plant, but not nearly as plentifully planted here as it deserves to be. The branches are clothed from top to bottom in March with little clusters of small yellow flowers, which glisten in the sunshine and last several weeks. I should place it in the same category among good garden shrubs

or small trees as the Witch Hazel, Hamamelis arborea, and if I had a large bank side which I wanted to cover with a deciduous little tree that would produce a beautiful effect in early spring, I would plant Cornelian Cherry in preference to all others. I am not aware if it is largely grown in the gardens of the United States, but I should say it is hardy enough for the neighborhood of New York. It is a native of many parts of Europe and northern Asia. Its fruits are about the size and shape of olives, and cornelian in color. The beautiful American C. florida cannot be made to flower in this country.

London. *W. Watson.*

New or Little-known Plants.

Echinocactus Wislizeni and some Related Species.

THIS fine large Cactus was first described by Dr. Engelmann in 1846. Since its discovery it has been one of the favorite Echinocacti in cultivation. It is by far the most abundant species of this genus in southern Arizona, and probably reaches its greatest development on the Tucson plains and adjacent foothills. So far as its distribution in Arizona is concerned, it is confined to the south-eastern portion of the territory, with the Tucson Mountains as its western limit. Its northern limit seems to be as marked as its western. Some forty miles north of Tucson it entirely disappears, and its place there and to the west is taken by E. Le Contii. It extends eastward through southern New Mexico into western Texas, and southward far into Sonora. This plant has been reported from much farther north than the range here given, but my observations for the past three years draw me to the conclusion that in such cases it has been confused with other species.

Echinocactus Le Contii was first described as a distinct species, but later placed as a variety of E. Wislizeni. There is no question but these plants are specifically distinct. The former is the characteristic Echinocactus from the mountains north and east of Phœnix to Yuma, occupying the valleys of the Salt and Gila Rivers and adjacent foothills. It differs from the latter in being usually much more slender and more apt to branch; not infrequently a dozen compact, globose heads form a single plant. E. Le Contii is seldom over a foot in diameter, and frequently only from four to six inches. It is usually from one to three feet high. A few specimens south of the Bradshaw Mountains, observed last summer, were nearly six feet in height and eighteen inches in diameter. The flowers appear during June and July, and the fruit begins to mature in August. The flower-buds are brownish-red and usually have an oval or obtuse apex. When fully open, the flowers are yellow. The under sides of the petals are more or less colored with brown and red. The fruit dries on the plant during fall and winter and sometimes remains, held by the dense tangle of spines, for several years. It is longer, narrower and more scaly than in E. Wislizeni, and the seeds are slightly larger. In the latter species the flower-buds are acute and the petals are conspicuously streaked with red. The flowers do not appear until August and September, fully two months later than in the previous species. The fruit ripens in November and December and forms a bright yellow crown, which stands out in marked contrast to the deep green stem. The somewhat flattened oval fruit is frequently two inches in length and a little more than half as wide. It is always crowned by the withered remains of the flower. It remains attached to the plant without drying throughout the winter and late into spring.

One who sees these two plants in the field would never mistake them as belonging to the same species. As early as April the apex of Echinocactus Le Contii is a dense tangle of numerous red pubescent, twisted, nearly mature spines. At this time the apex of E. Wislizeni is nearly free, the spines of the new growth being a half-inch or less in length.

Some miles east of Phœnix, at the eastern limit of the range of Echinocactus Le Contii, and north of that E. Wislizeni, is found another large species of this interesting group, namely, E. Thurberi. This plant ranges from here along the headwaters of the Salt and Gila Rivers into New Mexico. It is much more of a mountain plant than either of the above-mentioned species.

An interesting plant grows north of Tucson, on the foothills of the Santa Catalina Mountains. I refer to a variety of Echinocactus Wislizeni* (see fig. 24, page 155). The plant from which the description is drawn was collected some three years ago, and is now growing in the Cactus garden at the University. It resembles E. Wislizeni in the season of flowering and ripening its fruit and in the arrangement of the spines. Its golden-yellow flowers and white spines against the green stem make it one of the most beautiful Echinocacti with which I am familiar.

All of these species are known indiscriminately among the Mexicans as Bisnaga. Americans know them as "Nigger-heads" and "Barrel Cacti." They are all great, heavy plants, with strong, hard spines. Echinocactus Wislizeni sometimes grows to a height of seven or eight feet, and reaches a diameter of more than twenty-seven inches. I have observed specimens with as many as forty ribs. All of these plants are very succulent and entirely without a woody skeleton. The long slender roots are few and small, compared to the great weight and size of the plant. In this locality the large plants invariably lean to the south-west. Their weight, small roots and lack of woody skeleton make them very unstable, and they settle over in the direction away from the prevailing wind. The whole interior of the plant is a soft, spongy, white, parenchyma tissue, which is so saturated with sap that it may be squeezed from it by the pressure of the hand. This fact has been woven into the fairy tale that the thirsty traveler lost on the desert may secure, by cutting into this plant, copious draughts of a cool and refreshing drink.

The spongy tissue is used to some extent in making candy and pickles. Its value for such purposes, however, does not depend upon any special flavor or nutritive value in the plant, but rather in that it serves as a body to hold sugar and other materials.

University of Arizona, Tucson. *J. W. Toumey.*

Plant Notes.

Andromeda Mariana.—A correspondent makes inquiries whether this plant is worthy of cultivation. Without doubt it is among the best of shrubs, and we can see no reason why it is not more generally planted, except the fact that it is a native plant, and, like many other native plants, has been neglected because it was originally the fashion to plant exotics. It is found along the Atlantic coast southward from Rhode Island in low, wet, sandy places. It is common in the Pine-barrens of New Jersey, and covers large tracts in Long Island. It is from two to four feet high. Its leaves are leathery, shining, oval in shape and deciduous. Its flowers, which appear in clusters from the axillary buds, are pure white, nodding, bell-shaped and of a wax-like texture. Unlike many other Ericaceous plants, it will thrive without being planted in peaty soil, although it grows well in deep loam mixed with peat. It is perfectly hardy. Its leaves remain on the long wand-like branches late in the season, and they often turn to an intense scarlet before they fall.

Inga pulcherrima.—The Ingas are stove evergreens from South America and belong to the natural order Leguminosæ. Many of them have rather unattractive flowers of light pink, but the flowers of this one are a very rich shade of crimson. Mr. G. W. Oliver writes that a specimen of this plant, now in flower in the Washington Botanical Garden, is one of the leading attractions of the collection there. The

* Echinocactus Wislizeni, albispina, var. nov. Globose to subcylindrical. Number and arrangement of the spines the same as in the species, differing from them in that they are entirely white. Flowers golden-yellow, with no trace of red on the under surface of the petals, appearing in July and August. Scales of the ovary much more numerous than in the species, and usually overlapping even in the mature fruit.

beauty of the flower lies in the stamens, of which there are something like forty in each one of the twenty flowers which make up a single head. The plant thrives equally well in the temperate house or stove, but when grown in the latter it flowers from two to four weeks earlier. The flowers appear with the new foliage, and the contrast between the two is very pleasing. Every summer the plant should be encouraged to make as much growth as possible, as the flowers are always produced on the previous summer's wood and are grown on peduncles an inch and a half long. The shrub grows to a height of about five feet.

Brunfelsia (Franciscea) latifolia.—Brunfelsias are evergreen shrubs, mostly from Brazil, and many of them have been long in cultivation. They need a warm house without too much sun, and, although they will take abundant water when growing actively, the ground should never be sodden, or the roots will suffer, and it is a long process to restore the plant to health. B. latifolia takes rank among very choice stove-shrubs, and healthy plants will be certain to bloom in profusion every spring. The flowers are an inch and a half in diameter, of a dark lavender color as they open, and they change to pure white. When planted in coarse peaty soil with good drainage they need no special care beyond a severe cutting back as they become established, in order to keep them compact—that is, to prevent them from growing into a straggling form.

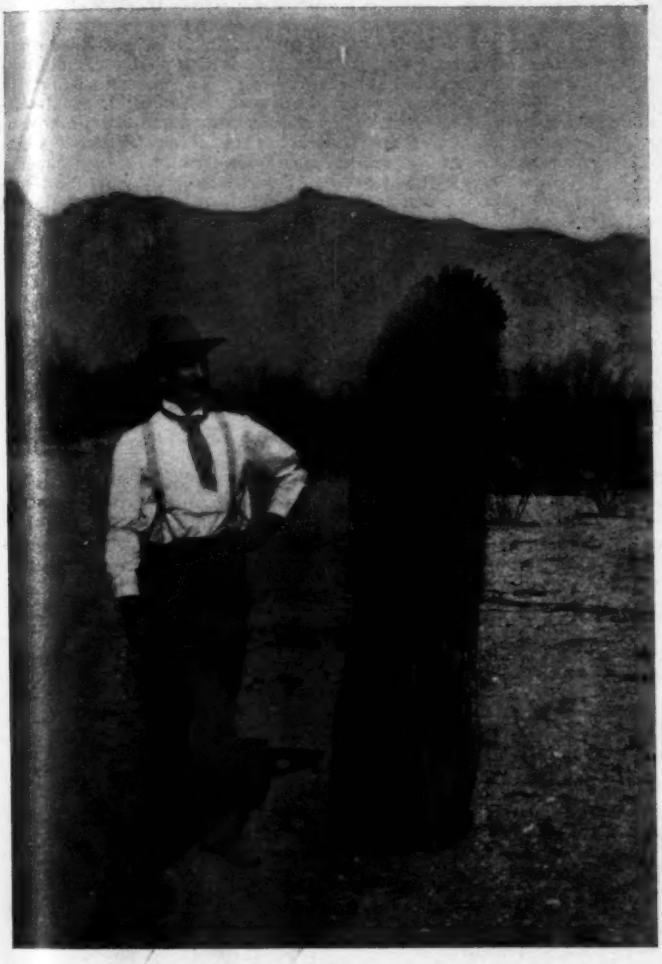

Fig. 24.—Echinocactus Wislizeni, var., growing in the Foothills of the Santa Catalina Mountains, Arizona.—See page 154.

Cultural Department.

A Test for the Quality of Potatoes.

EVERY one knows how much more palatable some potatoes are than others, and there is quite as marked a difference in their food value as estimated by the amount of nutriment they contain in the form of starch. Professor Goff, of the Wisconsin Experiment Station, has been making some tests with potatoes which are novel and suggestive, and they point the way to a line of investigation which it may be worth while to follow out with careful study. We reproduce, in a somewhat condensed form, Professor Goff's account of his experiments in the *Rural New Yorker*:

In making brine for beef it is an old custom to put a potato in water and stir in salt until the potato floats, and this usually proved a safe test. But if two or more potatoes are put in at the same time, they will rarely come up at once. Even when the potatoes are all of the same variety, and are taken from the same bin, considerable more salt is required to bring up some tubers than others. This means that some tubers have a higher specific gravity than others. Now, starch, the portion of the potato that makes it chiefly valuable for food, is heavier than water; hence the heaviest potatoes contain the most starch, and so have the highest food value. They are also finest for table use, because they have the most farinaceous or mealy quality when cooked.

Here is a pointer for potato epicures. By putting a bushel of potatoes into a barrel which is nearly full of water, and stirring in salt, the tubers of the lowest specific gravity—that is, those poorest in starch—will first come to the top. These may be picked off. By stirring in a little more salt another lot will rise, and thus the bushel may be assorted into several qualities. By rinsing the tubers in clean water as they are taken out, they are uninjured, either for table use or for planting, and it is surprising to one who has not made the test, to discover how great is the difference in the table quality of the lightest and heaviest tubers. The former will be soggy and salvy, while the latter will be flaky and farinaceous.

On discovering this marked difference in the quality of individual tubers of the same variety, the question naturally arose as to its cause. It has often been stated that pronged or knobby tubers are poorer in starch than others. The salt test easily shows this to be true. But some smooth tubers will usually rise as soon as the knobby ones, and it is an interesting fact that these light smooth tubers are often undistinguishable by any external mark from the heaviest ones, and this is true even of tubers that grew in the same hill.

Some years since I set out to discover the cause of this singular variation in the starch content of different tubers. The first suggestion was that it might be due to heredity. Accordingly, a lot of potatoes was assorted into three classes by the salt method, and the tubers showing the highest and lowest specific gravity planted separately. But no appreciable difference appeared in the specific gravity of the crops. The same line of selection followed another year showed no more definite results. The question next arose, whether the variation might not be due to the varying depths at which the tubers grew in the soil, and this appeared to be the true solution. Careful tests with several different varieties, and with different methods of culture, carried on through two consecutive seasons, showed that the tubers that grew nearest the surface of the soil were lowest in specific gravity; those that grew deepest were highest, and those that grew in the intermediate depth were intermediate in specific gravity. This fact suggested that the temperature of the soil in which the tubers grow, may have an influence upon their specific gravity, and that a comparatively cool temperature favors high specific gravity. In support of this view, it may be added that potatoes grown in level culture averaged higher in specific gravity than those hilled, and tests have shown that level soil usually averages lower in summer temperature than that which is ridged.

Potatoes grown closely in drills were found higher in specific gravity than those grown further apart in hills—the more largely shaded soil of the drill culture being thereby rendered

cooler. The commonly accepted view that potatoes grown in comparatively cool climates are usually of better quality than those grown in warmer climates is supported by these results, and we would expect that mulching Potatoes during the hotter part of the season in the warmer climates would tend to improve the quality of the tubers.

The market value of potatoes should be based on their specific gravity. There is no reason why potatoes containing but twelve per cent. of starch should sell for as much per bushel as those containing twenty per cent.; yet such is the case under the present methods of sale. The latter are worth nearly double the former for food, besides being more desirable in every way. Variations as great as this in the specific gravity of potatoes are not unusual. The salt test admits of very easy and economical application. All that is needed is a large candy jar or other wide-mouthed, capacious glass vessel, a hydrometer, a little salt and a few quarts of clean water. A dozen uninjured tubers may be selected as a sample, washed clean and placed in the standard salt solution, which will at once answer the question as to their average specific gravity and consequent food value. When potatoes are sold on their merits as food, rather than on the amount of bulk that they fill, farmers will have some encouragement to produce tubers that contain starch, rather than those that contain water, and potatoes will be more used for food, because their food value and palatability will be increased.

Notes on Orchids.

Lycaste Skinneri.—This is one of the best-known Orchids, and one of the most satisfactory to grow, being of easy management and semi-terrestrial in habit. There is considerable variation in the flowers, which is quite noticeable when a number of plants are in bloom at the same time. One of the purest of white Orchids is the white form of Lycaste Skinneri; from this variety the colors vary to deep crimson through all the intermediate shades. A year ago we had some two dozen plants, but they took up too much room on the side benches, due to the spreading habit of the foliage, and we concluded to put them in baskets and suspend them in the cool greenhouse. The experiment has been a decided success; in fact, the plants seem to do much better than when the roots were confined in pots. The baskets are twelve inches in diameter, and some of these have at this time over fifty open flowers. The blossoms are very durable, owing to their wax-like texture, and the plants are especially suitable for room decoration at this season. To grow L. Skinneri well the cool house should be kept at about fifty degrees as a minimum. It is one of the easiest of Orchids to accommodate.

We find that these semi-terrestrial Orchids, Lycastes particularly, will take liquid nourishment at frequent intervals if applied in weak doses. Under this treatment bulbs of extra-large size are produced, and these bear from ten to twelve flowers each, and sometimes even more. The white form seems more delicate in constitution and needs a little more warmth and less moisture at the roots, or the bulbs become spotted with disease and are hard to grow out of it. A shady position is best during the season of growth, but in winter, when maturing, we give the plants full sunshine until the flowers commence to open. There is practically no resting period for L. Skinneri, or, at least, no continued period for drought at the roots; they should be kept moist at all times, and it is one of the reasons why the plants do not do so well sometimes when grown in pots.

Dendrobium nobile Allanianum.—Of the many well-marked forms of the old Dendrobium nobile, a few are conspicuous, especially among the dark ones. After the variety nobilius, the variety Allanianum is, perhaps, the best, the flowers being of large size, very dark and unique, in having a fine polish over the entire surface of the flower. It is as distinct in its way as C. villosum is among Cypripediums. We find it to be a good grower, much better than D. nobile nobilius in this respect, a great point in its favor, for it is difficult to grow some of the rarest Dendrobes into specimens. We have given up the use of wood baskets for Dendrobes, as this genus resents disturbance at the root more than most Orchids, and it is hard to separate the roots from the wood when it becomes necessary to place the plants in larger receptacles. We use perforated pans and suspend them with wires; it is easy to break a pan and take out the plant. In the *Orchid Review* some time ago one of the best English cultivators advised that nothing but clean sphagnum-moss be used for Dendrobes, and asked gardeners to give this material a fair trial and report the results. I am in favor of the plan after a year's trial. These plants abhor sour, inert material about the roots, and this fresh living medium seems to be just what is needed. At the end of a year, or after the resting period, this moss is, of course, dead, and we take a Stott sprayer, removing the cap, and with warm water wash every particle of moss from the roots. If the roots are matted about the pans these are placed inside of larger pans with a few pieces of drainage, and the surfacing of moss added. It is surprising how soon the young roots take possession of this fresh moss. We have plants of D. nobile three years old, from an old bulb, that made growths two feet long last summer, and in one instance as many as six leads starting away strong for the present year.

Young plants observed starting away from the upper part of the bulbs of Dendrobiums at this season should be taken off now and potted in small pots, and these placed in a basket and suspended in a warm house. It is surprising how soon these make good plants to take the place of older and worn-out ones. At this time care must be taken that no water gets into the young growths on dull days, or they will soon rot off and the plant receive a check. This is especially true of D. Phalænopsis. To avoid this trouble we have used nothing but fern-root for potting material; in this instance moss seems to retain too much moisture about the few roots made, and these are very susceptible to overwatering. The best time to repot D. Phalænopsis is now; small pans should be used—the smaller the better—and they should be suspended in the warmest position in the East Indian house. Plants of this species imported last fall are starting away finely hung up close to the light, and will flower sooner than those that were obtained some time ago and are well settled down to a regular period of growth.

Horticulture is said to be full of empiricisms, and even one genus of Orchids affords a study in the needs of each species. We often know nothing of the conditions under which they grow naturally, and when we are able to learn something of these conditions it is often impossible to imitate them under artificial means. So we have to grope along as best we may, sometimes stumbling upon a way in which a particular plant may be grown well for a long period.

South Lancaster, Mass. *E. O. Orpet.*

Caladiums for Outdoor Use.

ABOUT this time it will be in order to look over the bulbs of the fancy-leaved Caladiums which are meant for use out-of-doors this summer. The plan of putting them into pots to start their growth is not a good one, since by this method they sprout very irregularly. The best plan, I find, is to chop up some sphagnum-moss pretty fine and start them in that. If the collection is large a place on the bench should be given them; if small, they can be put in boxes. Put a layer of the sphagnum in the bottom about two inches thick, place the bulbs on this according to their kinds, then with a mixture of equal parts of sphagnum and sand cover the bulbs over evenly to a depth of about two inches. Give a very slight watering, keep the temperature about sixty at night, with a rise of about twenty by day. They will begin to sprout in a very short time.

This is the best time for propagating the desirable kinds; there are several ways of doing this. Before putting them in the sphagnum-moss some people prefer to make incisions in the bulb just inside the resting growths—that is, make an incision in the parent bulb between the lateral growth and the central part of the bulb. Immediately after making the incisions see that they are filled with some finely powdered charcoal, as this tends to prevent decay. After sprouting it will be found that numerous roots have been formed; take care that a sufficient number of these are taken with each piece of the bulb, so as to enable them to take hold of the soil immediately. Another plan, which I find to work well with the stronger-growing varieties, is to allow the leaves to become nearly developed, then, if there are sufficient side-growths to warrant it, break off the central growth close to the bulb; this throws strength into the lateral growths and induces new ones to appear.

The fine-leaved varieties lately sent out are of little or no use for bedding out, as they do not stand the sun sufficiently well, and I may say that these kinds are unsatisfactory for most purposes, as they grow too slowly to make large specimen plants, and are very slow to increase when compared with some of the older kinds. These drawbacks are much to be deplored, as the new Caladiums are exceedingly beautiful, but the fact is they are bred with an eye to producing the most gaudy colors, and it has evidently been forgotten that these colors are produced at the expense of constitution. A few of the kinds I have found best for planting out in summer in the full sun-

shine are Dr. Boisduval, Reine Victoria, Edouard Moreaux, Hookeri, Chantini fulgens, Adolph Adams, Triomphe de l'Exposition, Madame Heine, Madame Alfred Mame, and Schmidtzii.

Botanic Garden, Washington, D. C. *G. W. Oliver.*

Flowers of the Season.

WHITE flowers are never so effective in the gardens as colored varieties, and the early Snowdrops, even if grown in profusion, leave something to be desired for color. The most effective coloring for several weeks has been supplied by colonies of a Taurian variety of Scilla Sibirica, S. Sibirica Taurica. One colony of these bright plants closely planted forms a carpet about a yard square, giving an indication of possible effects when largely planted. This Scilla has good, broad, light green foliage, and flowers profusely on stems about three inches long. The flowers are lighter-colored, and rather prettier, than those of the ordinary S. Sibirica, which has not yet come into flower. It is one of the handsomest of early spring flowers, and regularly appears with me before the Snowdrops are fully in mid-season. Another Squill, S. Whittalli, is darker-colored, with narrower leaves, and not as attractive. Asa Gray is said to have stated that a white form might be expected sooner or later among every species of flower. There are white forms of both S. Sibirica and S. bifolia. The former has not yet arrived here, but S. bifolia alba forms a colony of dainty pure white flowers at present. This appears to be a form of S. bifolia, and at a glance might be mistaken for a dull Chionodoxa, the flowers facing upward on the curved stems, and the leaves being narrow and dark-colored.

There are few brighter flowers than Chionodoxa Luciliæ, which now enlivens the border. The type of this variety, which has large star-like flowers with bright blue-tipped petals with white eyes, leaves little to be desired as a small border-plant, besides which it may be readily secured without much expenditure of capital. The pink and white forms are flowers of exquisite beauty, but in my garden are not as vigorous in growth or as free-flowering as the type. They have never been found in large numbers in Asia Minor, and are said to not come true from seed, so that they are not plentiful. C. Cretensis is also white, or slightly tinted, but the white is impure and the flowers are inferior to those of C. Luciliæ. C. Tmolusi is very much in the way of C. Luciliæ, but the flowers are darker and the effect of the two is quite different when seen in masses. The large-flowered C. Alleni and grandiflora seem to require more careful culture than C. Luciliæ to become effective in the border. Under ordinary cultivation the stems bear only two or three flowers. The red varieties of C. grandiflora are of a light purplish-red, but attractive. The smaller bulbous reticulate Irises are mostly out of flower. These, as I have noted before, are all hardy here, with the exception of I. Histrio, and flower regularly each season. I. Bakeriana is the prettiest of the smaller species of this section, while I. histrioides is the largest. These, however, all pale before the gayety of I. Rosenbachiana, which, as noted last week in Garden and Forest, is quite the best Iris of the season.

The late winter was a severe test of the hardiness of plants, and it speaks well for the hardiness of the Irises that there are no vacancies among the established plants in my collection of varieties of all sections. About the extent of the damage was the burning of the leaves of a few kinds, like I. Tingitana and I. stylosa, which are better grown under cover if certainty of flower is desired.

Elizabeth, N. J. *J. N. Gerard.*

Plants for Spring Forcing.

WITHIN a few years past the practice of using plants in flower for house decoration in the Easter season has extended largely. Every year a wider variety of plants is forced for this trade, and every year better-grown and more shapely plants are demanded, so that the florists' shops are never so beautiful as they are at this season.

Among plants of comparatively recent introduction the improved form of Astilbe Japonica, known as variety Compacta, is found valuable for forcing. Its spikes are much more compact than those of the type, the flowers are semi-double and the color is almost pure white. This variety seems to force as readily as the well-known old plant, and it flowers quite as freely, while the blooms are more lasting. A still later introduction has been named Astilbe Japonica floribunda, and is claimed to be superior to the variety Compacta, but it has not been largely forced in this country as yet, and it is too soon to make comparisons.

The Bottle-brush, Callistemon speciosa, has been growing in popularity for two or three years past, and in some localities is much sought for. The bright-colored stamens of its terminal spikes of flowers are very showy. The plant belongs to the Myrtle family, and forces as readily as an Azalea, though a little longer time is required to develop its blossoms. It is preferably propagated by cuttings, and the young plants secured by this method are more floriferous than seedling plants.

Cytisus Andreanus has also been tested to some extent for spring forcing, but, though its showy flowers are quite freely produced, the plant is somewhat naked in appearance and rather too stiff in outline. One of the Bladder-nuts, Staphylea Colchica, although an old plant, is just beginning to find favor in Philadelphia for spring forcing, although it has been put to this use for many years in England. This Staphylea bears panicles of white flowers similar to those of the American Bladder-nut, S. trifolia, but the plant is more dwarf, and the foliage is divided into five leaflets instead of three.

Single and double Lilacs are both used largely for conservatory decoration in the early spring, shapely plants between two and four feet high being the most satisfactory. Plants grown in pots during the preceding summer have the best roots and are most reliable. The Lilacs used for forcing are usually imported stock, and are generally grafted plants.

Pyrus Japonica has also been forced somewhat of late years, and the flowers are usually much lighter in color than they are on plants naturally grown.

Forsythia suspensa is still another hardy shrub that forces well if lifted in the fall, potted up and stored in a cold frame until it is needed. The Double-flowered Almond is also adapted to this use, and needs the same treatment. Exochorda grandiflora is rather too stiff in habit, and not bushy enough when small to make a good pot-plant. But it is forced to some extent. Hardy Rhododendrons and Ghent Azaleas can be brought into flower with as little trouble as the Indian Azaleas. But the Ghent Azaleas lack foliage, since the flower-buds grow much faster than the leaves when the plants are forced into bloom. Various shrubby Spiræas and Deutzias are used here, and they generally submit with grace to the forcing process, and all are beautiful in flower.

Some Acacias, notably A. Drummondii, A. Riceana and A. armata, are now found in the stock of all well-equipped establishments, and, though not new plants, are sufficiently uncommon to be genuine novelties to many buyers, and it is said that they have been sold as novelties by some dealers.

Holmesburg, Pa. *W. H. Taplin.*

[In addition to the plants named above, many others have been forced into bloom for the Easter trade in this city. Tree Pæonias, carrying two or three large flowers, are very showy. The Japanese Snowball is also effective as a pot-plant. Mountain Laurel, Kalmia, is quite abundant. The beautiful native Andromeda speciosa, as well as A. Japonica, are also offered, but are uncommon.—Ed.]

Thinning Grapes.

IN the indoor grapery thinning out of the berries is always more or less necessary, according to the variety of the Grapes, as some varieties mature much larger berries than others and, therefore, require more space. The most convenient stage of growth for thinning the bunches varies also according to the variety. Black Hamburg, Barbarossa and similar varieties which set freely, require to be taken at a smaller stage than those varieties which are more shy in setting, as the Muscat varieties. It is not advisable, however, to take them too small, as the berries which are going to stone cannot be determined from those which are not. If the clusters are neglected too long and become overcrowded, the thinning is difficult to perform. The bunches should never be touched with the hand as sweat from the fingers causes rust and disfigurement of the berries, and also impairs the bloom, which begins to form at an early stage. It will often be found necessary to raise the bunch or turn it around a little to get at it conveniently with the scissors, and this can best be done by means of a small piece of wood cut something in the shape of a pencil, but more gradually tapering to one end. This will also be found useful to steady the bunch when required. Thinning is practiced not only to enlarge the berries, but also to produce as large bunches as possible. Each bunch is divided into several small clusters, and the terminal berries on each of these should, if possible, be left and the inner ones thinned out; just enough of the latter being left to fill up the centre, so that the bunch, when matured, will remain compact when cut and laid on its side. If too severely thinned out in

the centre the bunch would fall flat when placed in a dish, which would greatly spoil its appearance for table use. All fair-sized bunches should have the shoulders tied up a little, and with large bunches it is often advisable to tie up several of the upper divisions. This allows the berries room to swell without being thinned out so severely. Grapes intended for winter use require more thinning than those to be used early, or they are apt to damp off in the centre of the bunch.

Tarrytown, N. Y. *William Scott.*

The Vegetable Garden.

IN this latitude work in the vegetable garden is backward. Our first sowing of Peas was not made until April 6th, more than three weeks later than the earliest sowing last year. But there is too often undue hurry about getting seed into the ground as soon as frost breaks and before the soil has become sufficiently warm and dry. Sometimes a gardener takes pride in getting his seed in before his neighbors do, but those who wait until the ground wŏrks freely have the best garden in the end. We have now made sowings of Spinach, Carrots, Turnips, Beets, Parsnips, Salsify and Onions. We shall make a second sowing of Peas about the 20th of April, using Maclean's Advancer, Shropshire Hero and Juno. Champion of England, Stratagem and Telephone for the main and late crops are sown early in May. The middle of May is soon enough for Bush Beans, but for early picking we work in some well-decayed manure where the Violets are done blooming in cold frames, and plant one or two sashes with Early Mohawk about the 15th of April. In this way we get beans a month ahead of the first outdoor plants.

Onions in flats, under glass, should now be well hardened and ready to plant out. They produce much finer bulbs than when sown outside in the ordinary way. They ought to have rather more growing space, some eighteen inches between the rows and six inches between plants. Beets can be transplanted in the same way, but being more susceptible to injury from frost they should not be set out before May. Lettuce raised in frames can be planted out at once, and sowings of Lettuce and Radishes made at short intervals. Shallots and Garlic should be planted without delay. Leeks are not sufficiently appreciated, as they are much superior to onions for soups on account of their more delicate and milder flavor; they are easily cultivated and stand the most severe winter without injury. In the north of England and south of Scotland many people of the working class pay special attention to this vegetable and grow marvelously fine specimens, and the competition in the numerous vegetable shows is very keen. Seeds started now will give leeks before winter. They should be planted in trenches containing plenty of well-rotted manure and treated liberally like Celery. The finest variety we have grown is the Lyon; other standard sorts are Musselburgh and Giant Carentan.

Early Celery should now be pricked off in boxes and kept growing in a warm house. Before it becomes crowded we transfer ours to frames, planting some six inches apart each way. A little warm manure below the compost will give the plants a good start. Succession sowings for winter use can now be made. For this purpose we find Giant Pascal and Kalamazoo the most satisfactory. We tried a trench of the last named during the past year, and it kept in good condition until the middle of March. Egg-plants and Peppers, when large enough to handle should be pricked off, and Tomatoes for the main outdoor crop should be handled before they become crowded and spindling. For an early crop the plants should be grown singly in pots and staked up securely. They must not be allowed to get pot-bound and take on a yellowish color. Tomatoes fruiting under glass will now require abundant waterings. With the increasing sunlight artificial pollination may now be dispensed with. Liquid-manure, applied twice a week, and a surface-dressing of sheep-manure or some chemical fertilizer in addition, will suit pot-grown plants; laterals will require removing weekly, and some of the leaves shortened to admit light to the fruit.

Cabbage-plants should be well hardened before they are set out, and we find it risky to plant out Cauliflowers before May 1st. The plants grown in frames will need plenty of water and liquid stimulants to keep up free growth. Brussels Sprouts are the most useful of the Brassica family for winter, and the fact that large quantities are imported annually from Europe would indicate that more of these should be grown to supply the demands in the large cities. Many worthless strains of this vegetable are on the market, and it seems to be difficult to secure a reliable strain. It is very annoying to raise a good bed of these plants and find that not over one in twenty is worth the space it occupies. Sutton's Exhibition and Aigburth are excellent sorts if they can be procured true to name, and now is a good time to make a sowing.

Melons and Cucumbers for an early outdoor crop can now be started in pieces of turf or in four-inch pots, thinning the plants out to four or five in each. Cucumbers in hot-beds require copious supplies of water in clear weather. The frames should be closed early in the afternoon after watering; the fruit will swell quicker if the blossoms are artificially pollinated. Lettuce, Parsley, Beet, Carrot and any other crops in frames should have abundant ventilation whenever the weather permits it, and the surface soil should be stirred occasionally, and the sashes removed whenever there is a warm rain.

Taunton, Mass. *W. N. Craig.*

Bulbocodium vernum.—In warm, sunny spots this plant, the Spring Meadow Saffron, has been blooming for a fortnight or more. A native of southern Europe, it has long been in cultivation, but it is not generally planted in this country. The flowers are about four inches long, of a bright rosy purple when in bud, which changes to a somewhat lighter shade on full expansion. The plant associates admirably with the Crocuses and Snowdrops, adding a new and distinct color. It is perfectly hardy, and, when once established, should not be disturbed for several years, since it is, like many of this class of plants, most effective when grown in masses. It should have the same treatment as the Crocus or Snowdrop. There is a variety with variegated foliage which is not desirable.

Boston. *R.*

Fig. 25.—Carnation Plant with Aërial Roots.

Correspondence.

Aërial Roots of Carnations.

To the Editor of GARDEN AND FOREST:

Sir,—Samples of strange-looking Carnation-plants have been sent to this station, with queries as to the nature of the trouble and the remedy for the same. At first sight the stems seemed to be covered with a peculiar dark growth unlike that of any fungus known to me. A further inspection showed that the stems had pushed multitudes of small roots (see fig. 25, on this page), which stood close together, and had turned dark brown in color, due to the growth of a black mold—Macrosporium, sp.

The precise reason for this peculiar development of roots along the stems cannot be stated, but since the plants had been watered frequently in excess it is not improbable that the formation of the roots was a result of this surplus of moisture.

As only about two dozen plants in a house of ordinary size behaved this way, it is likely that some plants have a greater tendency to throw roots than others or were more favorably situated, or both.

Rutgers College. *Byron D. Halsted.*

The Preparation of Bordeaux Mixture.

To the Editor of GARDEN AND FOREST:

Sir,—The Patrigeon method of preparing the Bordeaux mixture was first published in the spring of 1890.* The directions were to add the milk of lime to a solution of copper sulphate until a twenty per cent. solution of the ferrocyanide of potassium would show no discoloration when added to the mixture. This process soon became known in America, and we find the following directions for preparing the fungicide:†

"The copper sulphate is weighed and mixed with an amount of water sufficient to dissolve it. When it is completely dissolved, the lime, in the form of thin whitewash, is strained through burlap (gunny sacking) into the copper sulphate solution. A drop or two of potassium ferrocyanide (saturated aqueous solution) added from time to time, after thoroughly stirring the mixture, will show when enough lime has been added to form the Bordeaux mixture. If not enough lime has been used the drop of ferrocyanide will turn to a very dark color the moment it touches the mixture; if enough lime has been used the ferrocyanide will not change color when it is dropped into the mixture."

The substance of the above extract was repeatedly published, and it appeared as late as the summer of 1894.‡ Users of the test have been at the same time cautioned to use a sufficient amount of lime, since an excess would do no harm to foliage. But in no case has it been advised to add an excess of lime, the amount called for by the test being sufficient, provided the preparation was well stirred and the proper care exercised in the use of the test. Yet in the fall of 1894 we find that the original formula is no longer unconditionally recommended, but that "a little more lime should be added after this test shows no color," in order that there may be no doubt that enough shall be present.§

The question now arises, why is lime added to the Bordeaux mixture after the immediate demands of the ferrocyanide test have been satisfied? The following considerations may help us to find the correct answer:

(1) When the milk of lime is added to a solution of copper sulphate, the latter is broken up and new compounds are formed. The lime is not added merely to neutralize the acidity of the solution, but a sufficient amount should be present to satisfy all chemical changes. But all these changes do not appear to take place at once; "so it occasionally happens that after the mixture has been standing a few minutes the potassium ferrocyanide will again give the dark color, showing that not enough lime had been added."‖ It is an undisputed question that a sufficient amount of lime must be added to prevent any of the copper sulphate from remaining in solution, otherwise the foliage of nearly all plants will sustain injury. Yet the Bordeaux mixture, when prepared according to the original directions of Patrigeon, is not supposed to contain an excess of lime; in fact, the value of the test rests in its power to detect just when no more lime is needed.

(2) That foliage is occasionally injured by the Bordeaux mixture when prepared with the minimum amount of lime cannot be doubted, for injury has followed the use of the mixture when it contained considerable quantities in excess. No definite experiments appear thus far to have been made for the purpose of comparing the action of the Bordeaux mixture when prepared with the ferrocyanide test, and that made, in accordance with the commonly accepted formulas. Fairchild, who has made a special study of the Bordeaux mixture, was in doubt regarding the advisability of accepting Patrigeon's method without further experimentation. He says:¶ "It is possible, also, that pathologists have proceeded too rapidly in recommending the use of potassium ferrocyanide in the preparation of this mixture. It has not yet been definitely settled that the mixture, when prepared according to this method, will not contain the basic sulphates and occasionally prove injurious. In attempting to avoid the inconvenience in the preparation of Bordeaux mixture the greatest care must be taken that its real value is not impaired. The excess of lime in the mixture, instead of being an injurious element, may prove beneficial, preventing injuries from the copper salt, and in other ways being of advantage." Professor Bailey, after extended observation throughout this state during the past season, has come to the following conclusion:* "This test indicates when sufficient lime has been added to correct the present injurious effects of the sulphate of copper; but in wet seasons—if, in fact, not in all seasons—an extra amount of lime may be needed to neutralize subsequent changes in the compound. I am strongly of the opinion that the regular formula for the Bordeaux mixture . . . is the safest and best one." My own experience has shown that the most serious cases of the rusting of apples have been in orchards treated with the Bordeaux mixture, prepared with the aid of the test, the applications having been made in orchards about Ithaca, and also in the western part of the state. At Ithaca we had orchards containing the same varieties for comparison, the one having been sprayed with Patrigeon's Bordeaux mixture, the other with that made according to a formula. No definite data can be given, but the impression received from the examination of the two orchards was unfavorable to the use of the test; so much so that a considerable excess of lime was added when the mixture was prepared the second time.

(3) The chemistry of the Bordeaux mixture, as now understood, indicates that more lime is necessary than the ferrocyanide of potassium test demands. Abundant experimentation has shown that the carbonic acid found in rain and dew exerts a solvent action upon the copper compounds found in the mixture whenever no excess of lime is present. In other words, the greater the excess of lime in the Bordeaux mixture, the more slowly will the copper compounds be dissolved, and, therefore, the smaller the excess the more quickly will the copper enter into solution. The solvent action of the water is greater where there is much dew or where the rainfall is more or less continuous. Light rains and a moist atmosphere will dissolve the copper most readily, and the solution will collect upon the foliage unless the rainfall is sufficiently violent to wash it off. Which form of the copper is most readily dissolved from the mixture is uncertain, but Willard has suggested that the solution contains considerable quantities of the sulphate of copper, a compound which is known to be caustic to foliage.† Such conditions very readily explain the injury done by the Bordeaux mixture in 1894, and also the increased injury following the adoption of Patrigeon's method of making it.

(4) The Bordeaux mixture is now frequently applied with Paris green or London purple. These poisons are unsafe to apply to the foliage of many plants unless lime is added to the liquid. But if the Bordeaux mixture does not contain an excess of lime, injury may follow the application of such a combination, especially in a wet season. When Patrigeon's method is recommended, special direction should be given for cases in which arsenites are to be used with the fungicide.

(5) A serious objection to relying upon the ferrocyanide test is the danger arising from its improper use. This was clearly shown in the article of Professor Beach on page 128 of the current volume of GARDEN AND FOREST. Serious injury may follow, and appears to have followed, from such mistakes. When a definite formula is employed there is less liability of error, and, to my knowledge, no preparation has proved itself safer, when the proper ingredients are used, than the formula given below.

Color tests possess a decided value in the preparation of the Bordeaux mixture, since they mark a certain stage in the preparation of the compound. The color of the mixture itself also shows the same. I have frequently made this fungicide without the aid of scales or of the ferrocyanide test, basing the amount of lime added upon the color of the mixture. The use of the test is safer, however, and if a sufficient excess of lime is added the preparation must be as effectual and as safe as if the ingredients had been weighed. But this excess of lime is an uncertain quantity, and as a general recommendation I should prefer six pounds of copper sulphate, four pounds of quicklime and forty to fifty gallons of water as the safest proportions. I have used the formula for three years, partly because the fungicide was used in experimental work and a definite compound was desired; in other cases the ferrocyanide test or the color test of the mixture served as a guide to the proper amount of lime. During this time I have not once strained either the lime or the Bordeaux mixture, since in making the application no trouble was experienced from the clogging of machinery. The McGowen nozzle has been used almost exclusively. With the Vermorel nozzle it may be advisable to strain the lime in the majority of cases, although not necessarily more because the latter is weighed. The weigh-

* Patrigeon, *Journal d'Agriculture*, Prat., 1890, May 15th, p. 701.
† Beach, Annual Report New York Agricultural Experiment Station, 1892, p. 539.
‡ New York Agricultural Experiment Station, 1894. June Bulletin 72, p. 346.
§ New York Agricultural Experiment Station. September Bulletin 74, p. 404.
‖ New York Agricultural Experiment Station, 1894. September Bulletin 74, p. 404.
¶ Bordeaux Mixture as a Fungicide. U. S. Department of Agriculture, Division Vegetable Pathology, 1894. Bulletin 6, p. 14.

* Cornell Agricultural Experiment Station, 1894. October Bulletin 74, p. 382.
† Cited by Fairchild, Bordeaux Mixture as a Fungicide, page 14.

ing of the lime certainly is a slight inconvenience, but has thus far not proved very objectionable.

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Notes.

Perhaps it ought to be stated that it is Professor Tuomey himself whose portrait is given with that of the Cactus on p. 155.

Professor Halsted writes that the late winter has been very trying upon the English Ivy which covers many of the older buildings in New Brunswick, New Jersey. The leaves are mostly brown, many of them dead and have the appearance of having been scorched by fire. It may be that the plants will revive with warm weather, but these old vines, which have been the pride of the city, are just now anything but attractive.

It is a well-known fact that many varieties of tree fruits which in the extreme north would perish in a hard winter if root-grafted, can be grown successfully if top-grafted on very hardy varieties. Dr. Hoskins finds that the Sops of Wine Apple is a common failure with him when root-grafted, but when grafted on the Peach Apple it endures the winters perfectly, and has borne profusely for many years, though here and there a limb has died and been removed.

Winter cabbage, which was very cheap until recently, now brings twenty cents a head, a price as high as that asked for new Florida cabbage. New string-beans cost thirty-five cents a quart, and $1.25 a half-peck is asked for peas. Large bunches of asparagus bring fifty cents. Romaine lettuce from Bermuda costs fifteen cents, chervil ten cents for a small bunch and dandelion fifteen cents a quart. Small heads of hot-house cauliflower may be had for forty and fifty cents apiece, and cucumbers grown under glass cost eighteen cents each.

Professor Jordan, of the Maine Agricultural Experiment Station, has been making some tests which show the folly of growing the large southern Corn in the northern parts of the country to be cut for fodder or for ensilage. This tall-growing Dent Corn makes a great bulk, but the season is not long enough to allow it to ripen. When it is cut in an immature state analysis shows that the Maine Flint Corn, which matures perfectly, is worth more than the southern Corn, pound for pound, judging simply by the per cent. of dry matter. It is also shown that the quantity of dry matter in an acre of Corn at maturity was two and a half times greater than it was at the silk period thirty-seven days before, and that the starch and sugars, which are the most valuable compounds, increase more rapidly than the less important constituents, so that the mature plant is of better quality than at any previous stage of growth.

Owing to the universal observance of Holy Week in the West Indies no pineapples have been received here for almost a week, though nearly five thousand barrels are expected within the next few days. The ripening of this fruit in Cuba has been retarded by dry weather, and the crop is estimated to be twenty-five to thirty per cent. less than that of last season. Prices now are somewhat higher than a year ago, but it is expected will be considerably lower in a fortnight, when the season will be fairly opened. The stock of California Navel oranges of the choicest brands is about exhausted, and a carload of good fruit sold here at auction on Monday averaged at wholesale the high price of $3.27 a box. Northern Spy and the brighter Ben Davis are the showiest apples now in our markets, and high grades of these command $6.00 a barrel at wholesale. Strawberries are comparatively plentiful in supply, and well-ripened fruit of good size may be had for forty cents a quart.

When we think of the teeming population which now fills many portions of our country west of the Rocky Mountains, and remember how famous, all over the world, is their singular beauty, and their incomparable value to the tourist, the health-seeker, the agriculturist and the horticulturist, as well as the miner, it is interesting to read what so intelligent a statesman as Daniel Webster thought of them just fifty years ago, and to know that his views were shared by many other prominent public men of the time. In a speech delivered in the United States Senate in 1844, with regard to the proposal that a mail service should be established between Missouri and the Pacific coast, Webster said: "What do we want with this vast, worthless area, this region of savages and wild beasts, of deserts, of shifting sands and whirlwinds of dust, of cactus and prairie-dogs? To what use could we ever hope to put these great deserts, or these endless mountain ranges, impenetrable, and covered to their bases with eternal snow? What can we ever hope to do with the western coast, a coast of three thousand miles, rock-bound, cheerless and uninviting, with not a harbor on it? What use have we for such a country? Mr. President, I will never vote one cent from the public treasury to place the Pacific coast one inch nearer Boston than it is to-day."

The tendency to use plants in flower for house and church decoration at Easter was stronger this year than ever, and was conspicuously manifested in the increased size of the specimens offered. Of course, there was a great array of Lilies, and plants were valued according to the number of flowers they carried, each flower being valued at twenty-five cents. Sometimes several bulbs had been grown in one receptacle, and these masses, when exceptionally well-flowered, often commanded, with the fancy baskets in which they stood, $10.00. There were Dutch bulbous plants, Hyacinths, Tulips and Daffodils, in abundance; Violets and Cyclamens in pots, and Astilbe in great quantities, including some of the newer varieties under various names, all very beautiful, but none of them superior to the type, which, after all, has an airy grace which the more compactly flowered plants do not possess. Among many other shrubs forced into bloom, Hydrangeas, Cytisus and Azaleas were far the most numerous. Fine Hydrangeas, with ten or a dozen heads of flowers, often commanded $10.00. Trim little well-flowered plants of Cytisus could be had for $2.00, and larger ones, the price rapidly increasing with the size, cost $30.00, and even $50.00. Plants of this last grade had stems two inches in diameter and were six feet high and nearly as much across. The Azaleas sold for $4.00 for well-flowered plants a foot across, to $100 for densely flowered specimens five feet and more in diameter, and there is a story of an exceptionally large and well-flowered plant, some eight feet in diameter, which sold for $500. Singularly beautiful plants of Acacia paradoxa commanded $50.00. The clear yellow of these flowers and the deep green of the leaves made this altogether the most pleasing and showy of the yellow-flowering plants. Among the other flowering shrubs, specimens of the tree Pæony, Reine Elizabeth, were very effective. Our native Laurel, Kalmia latifolia, Andromeda speciosa and A. Japonica, Lilacs, Snowballs, Boronias, Metrosideros were more rarely seen, and the price for these varied according to their quality and size.

The fungus which spots the leaves of the Quince and produces the black spot on the fruit is nearly always present, and this is especially true when the trees are standing in sod. It is from the effect of this disease that the leaves of the Quince often begin to fall in August and in early September, while, of course, the foliage ought to persist until the fruit has ripened, for the loss of the leaves deprives the fruits of nourishment at the time when they are completing their growth. When the leaves die before their time the fruit remains small and immature. This defoliation also prevents the tree from storing up energy for the next year's crop. But not only is the fruit stunted before it is fully grown, but the fungus also attacks the fruit itself, causing cracks and lop-sided growth, as in the case of pears when attacked by the same fungus, Entomosporium maculatum. In a late bulletin on the Quince in western New York, Professor Bailey gives the results of experiments to show that this fungus can be held at bay by spraying with the useful Bordeaux mixture. On the 25th of June, last year, when the leaves in a Quince orchard had been already badly marked, this mixture was sprayed on so abundantly that all the foliage and limbs appeared deep blue when the application had dried. It was repeated on the 9th of July, when, although the disease did not appear to have progressed much, the foliage remained equally blighted in the sprayed and unsprayed portions of the orchard, and the fruit upon the sprayed portions was browned and discolored by the treatment. The experiments seemed so unpromising that nothing further was done, but on the 21st of September a visit to the orchard showed that the fruits on the sprayed rows were twice as large as those on the untreated rows. They were yellower, less fuzzy, uniform in size, and the russet discoloration had all gone. Half of the foliage had fallen from the unsprayed trees, and the remaining leaves were small and yellow. The foliage on the sprayed trees was large and dark green and plainly helping the growth of the fruit. Professor Bailey accounts for the fact that the sprayed fruits were less fuzzy than the other ones by supposing that this woolly covering, which is a living growth on the surface of the fruit, was killed by something in the application. The so-called moss, which is really one or more species of lichen which had overgrown the trunks of many trees, was also completely destroyed. Experience seems to show that the spread of the spot may be wholly checked, even after the leaves are conspicuously marked by it. Of course, it is unwise to wait until the disease appears, and the first application ought to be made soon after the blossoms fall.